ican Geologists. 8vo. pamph. New Haven, 1846. From the Geological Association.

Dr. S. G. Morton. Memoir of William Maclure. 2d ed. 8vo. pamph. 1844. From the Author.

Transactions of the American Philosophical Society. Vol. IX., New Series, Part 2. 4to. Philadelphia, 1845. From the Society.

O. Rich. Bibliotheca Americana Nova. 8vo. London, 1846. From the Author.

Transactions of the Royal Irish Academy. Vol. XX. 4to. Dublin, 1845. From the Royal Irish Academy.

S. Swett. Sketches of Distinguished Men of Newbury and Newburyport. No. 1. (Captain Moses Brown.) 8vo. pamph. Boston, 1846. From the Author.

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Annuaire Magnétique et Meteorologique du Corps des Ingenieurs des Mines de Russie. No. 1. (2me Année, 1842.) 4to. St. Petersburgh, 1844. From the Imperial Academy of St. Petersburgh.

Magnetical and Meteorological Observations made at the Royal Observatory, Greenwich, in 1843. 4to. London, 1845. From the Royal Society.

Philosophical Transactions. Part 2, for 1845. From the Royal Society of London.

Astronomical Observations, made at the Observatory of Cambridge, by Rev. Charles James Challis. Vol. XIV., for 1842. 4to. Cambridge, 1845. From the Author.

Two hundred and eighty-fifth meeting.

August 12th, 1846. — Quarterly Meeting.

The President in the chair.

The Corresponding Secretary read a letter from the Marquis of Northampton, accepting and acknowledging with much courtesy his election as a Fellow of the Academy.

Professor Peirce read the following astronomical communications from William Cranch Bond, A. M., Director of the Cambridge Observatory.

1. Moon Culminations,

Observed at Cambridge Observatory, corrected for Collimation, Level, and Azimuthal Deviation of the Transit Instrument, and for Clock Rate and Error on Sidereal Time.

Lat. + 42° 22′ 49″. Lon. West of Greenwich, 4 h. 44 m. 32 s.

Date.	Name of Object.	Sidereal time of meridian passage. h.	m.	s.	Seconds of Tabular A.R. s.	Diff. s.	Observer's initial.
1844, Oct. 20	γ Aquarii	21	01	09.32	09.44	+ 0.12	B^{2}*
"	ζ Cygni	21	06	21.24	21.29	+ 0.05	"
"	β Aquarii	21	23	24.50	24.48	— 0.02	"
"	ε Pegasi	21	36	35.34	35.29	— 0.05	"
"	☽'s 1st Limb	21	50	47.92			"
"	ϑ Aquarii	22	08	40.28	39.91	— 0.37	"
"	ζ Aquarii	22	20	52.28	51.90	— 0.38	"
22	γ Aquilæ	19	38	53.50	53.58	+ 0.08	"
"	α Aquilæ	19	43	13.47	13.40	— 0.07	"
"	β Aquilæ	19	47	42.15	42.14	— 0.01	"
"	β Piscium	22	51	00.63	00.58	— 0.05	"
"	γ Piscium	23	09	09.15	09.07	— 0.08	"
"	☽'s 1st Limb	23	29	55.62			"
"	ω Piscium	23	51	22 99	22.55	— 0.44	"
23	☽'s 1st Limb	0	18	20.63			"
"	β Ceti	0	35	49.60	49.79	+ 0.19	"
"	δ Piscium	0	40	39.99	40.24	+ 0.25	"
Nov. 16	γ Aquarii	21	01	09.26	09.03	— 0.23	"
"	β Aquarii	21	23	24.05	24.08	+ 0.03	"
"	☽'s 1st Limb	21	34	15.44			"
"	30 Aquarii	21	55	07.72	07.42	— 0.30	"
"	α Cephei	21	14	52.72	52.66	— 0.06	"
19	κ^{2} Piscium	23	31	59.76	59.71	— 0.05	B^{1}
"	γ Pegasi	0	05	17.26	16.92	— 0.34	"
"	☽'s 1st Limb	0	03	07.76			"
"	*d* Piscium	0	12	38.95	38.95	0.00	"
"	α Cassiopeæ	0	31	47.10	47.24	+ 0.14	"
"	β Ceti	0	35	49.51	49.63	+ 0.12	"
Dec. 16	γ Piscium	23	09	08.64	08.46	— 0.18	B^{2}
"	κ^{1} Piscium	23	19	00.02	59.97	— 0.05	"
"	☽'s 1st Limb	23	47	00.28			"
"	Arcturus	14	08	35.43	35.43	0.00	"
17	Arcturus	14	08	35.46	35.46	0.00	"
"	ω Piscium	23	51	22.20	22.04	— 0.16	"
"	☽'s 1st Limb	0	35	35.26			"
18	α Andromedæ	0	00	24.35	24.24	— 0.11	B^{1}
"	γ Pegasi	0	05	16.51	16.61	+ 0.10	"

* B^{1} is the initial of *William C. Bond;* B^{2}, that of *George P. Bond.*

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A.R.	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1844, Dec. 18	58 Piscium	0 38 57.82	56.93	— 0.89	B[1]
"	ε Piscium	0 54 55.32	55.61	+ 0.29	"
"	☽'s 1st Limb	1 24 09.92			"
"	π Piscium	1 28 54.68	54.86	+ 0.18	"
"	β Arietis	1 46 06.65	06.93	+ 0.28	"
20	α Cassiopeæ	0 31 46.53	46.55	+ 0.02	B[2]
"	β Ceti	0 35 49.27	49.29	+ 0.02	"
"	58 Piscium	0 38 57.84	56.91	— 0.93	"
"	ψ Arietis	2 22 20.74	20.56	— 0.18	"
"	☽'s 1st Limb	3 03 42.34			"
"	ζ Arietis	3 06 02.02	02.27	+ 0.25	"
"	g Arietis	3 15 11.94	11.97	+ 0.03	"
1845, Jan. 12	☽'s 1st Limb	23 27 14.81			B[1]
"	α Andromedæ	0 00 24.05	23.91	— 0.14	"
"	γ Pegasi	0 05 16.13	16.33	+ 0.20	"
18	η Tauri	3 38 19.08	18.90	+ 0.18	B[2]
"	A^1 Tauri	3 55 34.56	34.38	— 0.18	"
"	γ^1 Eridani	3 50 49.62	49.67	+ 0.05	"
"	☽'s 1st Limb	4 29 05.21			"
"	τ Tauri	4 32 59.20	59.18	— 0.02	"
"	ι Tauri	4 53 52.47	52.48	+ 0.01	"
"	β Orionis	5 07 07.28	07.60	+ 0.32	"
19	τ Tauri	4 32 59.08	59.17	+ 0.09	B[1]
"	☽'s 1st Limb	5 21 37.91			"
"	δ Orionis	5 24 07.65	07.60	— 0.05	"
"	ζ Tauri	5 28 25.68	25.51	— 0.17	"
"	c Tauri	5 43 37.98	37.90	— 0.08	"
"	α Orionis	5 46 49.27	49.32	+ 0.05	"
March 16	χ^5 Orionis	5 54 44.80	44.79	— 0.01	B[2]
"	☽'s 1st Limb	6 24 38.95			"
"	γ Geminorum	6 28 47.41	47.30	— 0.11	"
"	ζ Geminorum	6 54 56.85	57.02	+ 0.17	"
19	☽'s 1st Limb	8 57 34.88			"
"	κ Cancri	8 59 23.12	23.29	+ 0.17	"
21	π Leonis	9 52 04.12	03.88	— 0.24	B[1]
"	α Leonis	10 00 09.62	09.53	— 0.09	"
"	☽'s 1st Limb	10 38 11.30			"
"	d Leonis	10 52 35.87	36.06	+ 0.19	"
"	p^4 Leonis	11 05 51.94	52.17	+ 0.23	"
"	δ Hyd. et Crat.	11 11 38.36	38.57	+ 0.21	"
April 15	☽'s 1st Limb	8 35 34.62			B[2]
"	α^2 Cancri	8 50 02.57	02.35	— 0.22	"
May 14	☽'s 1st Limb	9 53 12.26			"
"	α Leonis	10 00 08.87	08.88	+ 0.01	"
"	δ Leonis	11 05 53.72	53.75	+ 0.03	"
"	δ Hyd. et Crat.	11 11 38.18	38.19	+ 0.01	"
21	η Bootis	13 47 21.27	21.16	— 0.11	B[1]

Date.	Name of Object.	Sidereal time of meridian passage. h. m. s.	Seconds of Tabular A. R. s.	Diff. s.	Observer's initial.
1845, May 21	ε Bootis	14 38 15.96	16.02	+ 0.06	B^1
"	α^2 Libræ	14 42 22.29	22.33	+ 0.04	"
"	β Libræ	15 08 43.73	43.80	+ 0.07	"
"	α Cor. Borealis	15 28 10.51	10.55	+ 0.04	"
"	λ Libræ	15 44 24.45	24.41	— 0.04	"
"	β^1 Scorpii	15 56 29.74	29.65	— 0.09	"
"	ω Ophiuchi	16 23 01.35	01.14	— 0.21	"
"	☽'s 1st Limb	16 27 19.24			"
"	☽'s 2d Limb	16 29 47.53			"
"	m Scorpii	16 32 41.02	40.60	— 0.42	"
June 17	ι Libræ	15 03 27.29	27.52	+ 0.23	B^2
"	γ Libræ	15 21 55.32	55.43	+ 0.11	"
"	☽'s 1st Limb	15 52 35.65			"
"	β^1 Scorpii	15 56 29.75	29.82	+ 0.07	"
"	α Serpentis	15 36 41.73	41.43	— 0.30	"
July 15	α Serpentis	15 36 41.19	41.41	+ 0.22	B^1
"	β^1 Scorpii	15 56 29.91	29.83	— 0.08	"
"	δ Ophiuchi	16 06 17.22	17.17	— 0.05	"
"	Antares	16 19 59.07	58.95	— 0.12	"
"	☽'s 1st Limb	16 26 09.49			"
17	☽'s 1st Limb	18 39 33.49			B^2
"	π Sagittarii	19 00 37.02	37.05	+ 0.03	"
"	ϱ^1 Sagittarii	19 12 45.40	45.23	— 0.17	"
Sept. 8	α Scorpii	16 19 58.24	58.16	— 0.08	B^1
"	☽'s 1st Limb	16 42 50.74			"
"	η Ophiuchi	17 01 33.00	32.92	— 0.08	"
"	α Herculis	17 07 37.60	37.54	— 0.06	"
10	α Scorpii	16 19 57.96	58.12	+ 0.16	"
"	η Ophiuchi	17 01 32.87	32.88	+ 0.01	"
"	α Herculis	17 07 37.62	37.50	— 0.12	"
"	β Draconis	17 26 57.44	57.53	+ 0.09	"
"	4 Sagittarii	17 50 23.60	23.55	— 0.05	"
"	μ^1 Sagittarii	18 04 33.79	33.47	— 0.32	"
"	☽'s 1st Limb	18 48 12.29			"
"	o Sagittarii	18 55 27.38	27.56	+ 0.18	"
"	ϱ^1 Sagittarii	19 12 44.74	44.96	+ 0.22	"
11	α Herculis	17 07 37.72	37.48	— 0.24	B^2
"	o Sagittarii	18 55 27.59	27.54	— 0.05	"
"	π Sagittarii	19 00 36.60	36.76	+ 0.16	"
"	ϱ^1 Sagittarii	19 12 44.67	44.94	+ 0.27	"
"	e^2 Sagittarii	19 33 43.01	43.04	+ 0.03	"
"	☽'s 1st Limb	19 50 12.19			"
"	α^2 Capricorni	20 09 30.94	31.05	+ 0.11	"
"	ϱ Capricorni	20 20 04.93	05.08	+ 0.15	"
12	α^2 Capricorni	20 09 31.00	31.04	+ 0.04	"
"	ϱ Capricorni	20 20 05.04	05.07	+ 0.03	"
"	☽'s 1st Limb	20 50 31.08			"

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A. R	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1845, Sept. 12	ν Aquarii	21 01 12.77	12.98	+0.21	B[2]
15	β Piscium	22 56 03.62	03.62	0.00	"
"	γ Piscium	23 09 12.02	12.13	+0.11	"
"	ι Piscium	23 32 02.98	02.94	−0.04	"
"	☽'s 1st Limb	23 40 33.42			"
"	☽'s 2d Limb	23 42 47.76			"
"	E[1] Piscium	0 02 08.99			"
"	B Piscium	0 07 04.52			"
"	*d* Piscium	0 12 41.80	41.92	+0.12	"
16	ι Piscium	23 32 02.85	02.94	+0.09	B[1]
"	ω Piscium	23 51 25.23	25.42	+0.19	"
"	γ Pegasi	0 05 20.13	19.99	−0.14	"
"	*d* Piscium	0 12 41.57	41.92	+0.35	"
"	☽'s 2d Limb	0 37 04.89			"
"	δ Piscium	0 40 42.67	42.97	+0.30	"
"	ε Piscium	0 54 58.57	58.61	+0.04	"
17	δ Piscium	0 40 43.00	42.98	−0.02	B[2]
"	☽'s 2d Limb	1 30 01.54			"
"	*o* Piscium	1 37 17.62			"
"	β Arietis	1 46 10.03	09.70	−0.33	"
22	δ Orionis	5 24 08.42	08.58	+0.16	B[1]
"	ζ Tauri	5 28 26.88	26.72	−0.16	"
"	α Orionis	5 46 50.14	50.22	+0.08	"
"	☽'s 2d Limb	5 58 27.67			"
"	μ Geminorum	6 13 38.69	38.47	−0.22	"
"	γ Geminorum	6 28 48.63	48.55	−0.08	"
24	μ Geminorum	6 13 38.56	38.55	−0.01	"
"	γ Geminorum	6 28 48.70	48.61	−0.09	"
"	☽'s 2d Limb	7 40 41.52			"
Oct. 13	κ^1 Piscium	23 19 03.20	03.49	+0.29	B[2]
"	ι Piscium	23 32 02.99	02.99	0.00	"
"	ω Piscium	23 51 25.53	25.53	0.00	"
"	E[1] Piscium	0 02 09.42			"
"	B Piscium	0 07 04.60			"
"	☽'s 1st Limb	0 10 44.60			"
"	δ Piscium	0 40 43.30	43.15	−0.15	"
14	☽'s 1st Limb	1 04 17.51			B[1]
"	☽'s 2d Limb	1 06 29.59			"
"	α Andromedæ	0 00 28.04	27.86	−0.18	"
"	γ Pegasi	0 05 19.93	20.08	+0.15	"
"	*d* Piscium	0 12 41.96	42.04	+0.08	"
"	η Piscium	1 23 16.66	16 54	−0.12	"
"	*o* Piscium	1 37 17.42	17.31	−0.11	"
17	δ Arietis	3 02 51.58	51.17	−0.41	B[2]
"	ζ Arietis	3 05 05.12			"
"	☽'s 2d Limb	3 48 47.00			"
"	γ Tauri	4 11 03.51	03.14	−0.37	"

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A.R.	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1845, Oct. 17	δ Tauri	4 14 04.95			B²
21	ζ Geminorum	6 54 59.04	58.91	— 0.13	"
"	51 Geminorum	7 04 32.28			"
"	δ Geminorum	7 10 55.79	55.71	— 0.08	"
"	☽'s 2d Limb	7 19 50.06			"
"	κ Geminorum	7 24 49.58	49.19	— 0.39	"
"	g Geminorum	7 37 12.64	12.55	— 0.09	"
22	ζ Cancri	8 03 32.88			"
"	☽'s 2d Limb	8 09 35.73			"
"	ϑ Cancri	8 22 48.76	48.57	— 0.19	"
"	δ Cancri	8 35 55.77	55.53	— 0.24	"
23	α² Cancri	8 50 03.36	03.38	+ 0.02	"
"	☽'s 2d Limb	8 58 18.36			"
Nov. 5	☽'s 1st Limb	20 12 08.00			"
"	ρ Capricorni	20 20 04.48			"
"	ε Aquarii	20 39 20.20	20.25	+ 0.05	"
7	β Aquarii	21 23 27.18	27.15	— 0.03	"
"	ξ Aquarii	21 29 33.26	33.16	— 0.10	"
"	λ Capricorni	21 38 14.68	14.92	+ 0.24	"
"	☽'s 1st Limb	22 05 22.86			"
"	γ Aquarii	22 13 42.36	42.47	+ 0.11	"
10	E¹ Piscium	0 03 09.16	08.09	— 1.07	"
"	B Piscium	0 07 04.58			"
"	d Piscium	0 12 42.00	41.92	— 0.08	"
"	☽'s 1st Limb	0 44 04.68			"
12	β Arietis	1 46 10.20	10.21	+ 0.01	B¹
"	α Arietis	1 58 31.94	31.88	— 0.06	"
"	☽'s 1st Limb	2 30 02.58			"
"	π Arietis	2 40 44.18	44.24	+ 0.06	"
14	η Tauri	3 38 22.28	22.26	— 0.02	B²
"	A¹ Tauri	3 55 37.77	37.61	— 0.16	"
"	☽'s 2d Limb	4 20 23.66			"
"	α Tauri	4 27 07.07	07.12	+ 0.05	"
"	ι Tauri	4 53 55.44	55.38	— 0.06	"
16	ζ Tauri	5 28 28.16	28.23	+ 0.07	"
"	χ¹ Orionis	5 45 17.42	17.75	+ 0.33	"
"	☽'s 2d Limb	6 07 29.48			"
"	χ⁵ Orionis	5 54 47.88	48.03	+ 0.15	"
"	γ Geminorum	6 28 50.16	50.16	0.00	"
19	ζ Cancri	8 03 23.73	23.16	— 0.57	"
"	ϑ Cancri	8 21 49.55			"
"	☽'s 2d Limb	8 38 27.86			"
"	κ Cancri	8 59 24.47	24.67	+ 0.20	"
21	☽'s 2d Limb	10 13 36.70			"
"	ρ Leonis	10 24 41.68	42.13	+ 0.45	"
"	48 Leonis	10 26 55.98			"
"	34 Sextantis	10 34 39.72	38.99	— 0.73	"

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A. R.	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1845, Dec. 5	α Aquarii	21 57 52.30	52.45	+0.15	B¹
"	ϑ Aquarii	22 08 42.06	42.24	+0.18	"
"	ζ Aquarii	22 20 54.02	54.19	+0.17	"
"	☽'s 2d Limb	22 43 01.42			"
"	γ Piscium	23 09 11.12	11.50	+0.38	"
"	γ Pegasi	0 05 19.68	19.69	+0.01	"
6	β Aquarii	22 56 02.84	02.91	+0.07	B²
"	γ Piscium	23 09 11.44	11.49	+0.05	"
"	☽'s 1st Limb	23 36 02.28			"
"	ω Piscium	23 51 25.22	25.03	—0.19	"
9	η Piscium	1 23 16.42	16.46	+0.04	B¹
"	β Arietis	1 46 10.04	10.12	+0.08	"
"	α Arietis	1 58 31.71	31.90	+0.19	"
"	☽'s 2d Limb	2 12 11.26			"
"	ψ Arietis	2 22 24.22	23.75	—0.47	"
"	π Arietis	2 40 44.55	44.28	—0.27	"
10	α Arietis	1 58 31.80	31.89	+0.09	"
"	ψ Arietis	2 22 24.02	23.75	—0.27	"
"	π Arietis	2 40 44.26	44.28	+0.02	"
"	☽'s 1st Limb	3 05 04.18			"
"	η Tauri	3 38 22.50	22.46	—0.04	"
11	ζ Arietis	3 06 05.82	05.53	—0.29	"
"	η Tauri	3 38 22.30	22.46	+0.16	"
"	☽'s 1st Limb	3 58 32.58			"
"	α Tauri	4 27 06.72	07.43	+0.71	"
12	δ¹ Tauri	4 14 05.48	05.48	0.00	B²
"	ε Tauri	4 19 39.73	39.73	0.00	"
"	α Tauri	4 27 07.32	07.44	+0.12	"
"	☽'s 1st Limb	4 52 14.32			"
"	ο Tauri	5 18 25.43	25.39	—0.04	"
13	α Arietis	1 58 31.76	31.87	+0.11	B¹
"	α Tauri	4 27 07.69	07.45	—0.24	"
"	β Tauri	5 16 35.95	35.95	0.00	"
"	☽'s 1st Limb	5 45 34.52			"
"	☽'s 2d Limb	5 47 45.45			"
16	☽'s 2d Limb	8 20 33.62			B²
"	δ Cancri	8 35 57.20	57.23	+0.03	"
"	α² Cancri	8 50 05.04	05.04	0.00	"
"	κ Cancri	8 59 25.60	25.53	—0.07	"
21	☽'s 2d Limb	12 18 06.52			"
"	γ¹ Virginis	12 33 51.94	51.83	—0.11	"
"	ψ Virginis	12 46 21.71	21.62	—0.09	"
23	γ¹ Virginis	12 33 51.86	51.86	0.00	"
"	ψ Virginis	12 46 21.30	21.66	+0.36	"
"	☽'s 2d Limb	13 08 51.28			"
"	Spica	13 17 05.63	05.58	—0.05	"
"	m Virginis	13 33 32.55	32.64	+0.09	"

Date.		Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A. R.	Diff.	Observer's initial.
			h. m. s.	s.	s.	
1846, Jan.	3	E[1] Piscium	0 02 08.36			B[2]
	"	γ Pegasi	0 05 19.59	19.39	—0.20	"
	"	☽'s 1st Limb	0 11 18.79			"
	"	d Piscium	0 12 41.22	41.35	+0.13	"
	"	α Cassiopeæ	0 31 49.70	49.67	—0.03	"
	"	β Ceti	0 35 51.90	51.87	—0.03	"
	"	δ Piscium	0 40 42.65	52.59	—0.06	"
	5	η Piscium	1 23 16.33	16.17	—0.16	"
	"	☽'s 1st Limb	1 56 21.73			"
	"	α Arietis	1 58 31.58	31.63	+0.05	"
	"	ϑ^1 Arietis	2 09 35.69	35.69	0.00	"
	6	α Arietis	1 58 31.71	31.62	—0.09	"
	"	☽'s 1st Limb	2 48 54.22			"
	"	ε Arietis	2 50 26.76	26.68	—0.08	"
	"	α Ceti	2 54 15.39	15.57	+0.18	"
	9	ι Tauri	4 53 55.87	55.88	+0.01	"
	"	ψ^2 Orionis	5 00 55.40	55.32	—0.08	"
	"	β Orionis	5 07 10.38	10.33	—0.05	"
	"	☽'s 1st Limb	5 27 59.50			"
	"	χ^1 Orionis	5 45 18.38	18.47	+0.09	"
	13	ϑ Cancri	8 22 50.97	50.85	—0.12	"
	"	δ Cancri	8 35 57.95	57.85	—0.10	"
	"	ε Hydræ	8 38 39.15	39.33	+0.18	"
	"	☽'s 2d Limb	8 48 40.66			"
	"	$\varkappa$ Cancri	8 59 26.26	26.17	—0.09	"
	"	ξ Leonis	9 23 40.41	40.61	+0.20	"
	14	δ Cancri	8 35 57.82	57.85	+0.03	B[1]
	"	ε Hydræ	8 38 39.36	39.34	—0.02	"
	"	ξ Leonis	9 23 40.67	40.61	—0.06	"
	"	☽'s 2d Limb	9 40 11.13			"
Feb.	4	η Tauri	3 38 21.94	22.02	+0.08	"
	"	λ Tauri	3 52 10.98	10.77	—0.21	"
	"	☽'s 1st Limb	4 17 53.20			"
	5	☽'s 1st Limb	5 10 59.30			"
	"	β Tauri	5 16 35.90	35.89	—0.01	"
	"	ζ Tauri	5 28 28.56	28.69	+0.13	"
	"	B Tauri	5 39 36.52			"
	6	γ Geminorum	6 28 50.86	51.05	+0.19	B[2]
	"	o Tauri	5 18 25 46	25.34	—0.12	"
	"	ζ Tauri	5 28 28.70	28.68	—0.02	"
	"	☽'s 1st Limb	6 03 28.98			"
	9	α^2 Geminorum	7 24 48.58	48.72	+0.14	B[1]
	"	29 Cancri	8 20 03.96	03.54	—0.42	"
	"	ϑ Cancri	8 21 50.76			"
	"	☽'s 1st Limb	8 34 37.02			"
	"	ε Hydræ	8 38 39.52	39.57	+0.05	"
	"	α^2 Cancri	8 50 06.19	05.96	—0.23	"

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A.R.	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1846, Feb. 9	κ Cancri	8 59 26.40			B[1]
12	o^1 Sextantis	10 38 06.70	06.73	+0.03	B[2]
"	☽'s 2d Limb	10 59 03.60			"
"	σ Leonis	11 13 14.10	14.03	—0.07	"
"	τ Leonis	11 20 03.36	03.34	—0.02	"
March 9	δ Cancri	8 35 58.20	57.97	—0.23	B[1]
"	α^2 Cancri	8 50 06.16	05.86	—0.30	"
"	☽'s 1st Limb	9 05 47.51			"
"	ξ Leonis	9 23 41.17	40.97	—0.20	"
"	ο Leonis	9 32 58.14	58.22	+0.08	"
11	α Leonis	10 00 12.80	12.53	—0.27	"
"	ϱ Leonis	10 24 44.41	44.43	+0.02	"
"	☽'s 1st Limb	10 40 47.87			"
"	*d* Leonis	10 52 38.74	38.92	+0.18	"
"	σ Leonis	11 13 14.02	14.29	+0.27	"
April 7	☽'s 1st Limb	10 22 12.70			"
"	α Leonis	10 00 12.04	12.31	+0.27	"
"	ϱ Leonis	10 24 44.40	44.27	—0.13	"
6	α^2 Geminorum	7 24 47.99	47.83	—0.16	"
"	β Geminorum	7 35 54.92	54.92	0.00	"
"	α^2 Cancri	8 20 05.55	05.50	—0.05	"
"	κ Cancri	8 59 26.12	26.03	—0.09	"
"	ο Leonis	9 32 57.73	57.95	+0.22	"
"	☽'s 1st Limb	9 34 51.77			"
"	α Leonis	10 00 12.06	12.32	+0.26	"
9	β Virginis	11 42 43.01	43.21	+0.20	"
"	☽'s 1st Limb	11 58 02.33			"
"	η Virginis	12 12 04.40	04.27	—0.13	"
"	γ^1 Virginis	12 33 54.06	53.97	—0.09	"
10	δ Hydræ	11 11 41.35	41.30	—0.05	"
"	γ^1 Virginis	12 33 54.12	53.98	—0.14	"
"	☽'s 1st Limb	12 45 49.10			"
"	α Virginis	13 17 07.60	08.04	+0.44	"
11	δ Hydræ	11 11 41.38	41.31	—0.07	"
"	α Virginis	13 17 07.96	08.08	+0.12	"
"	ϑ Virginis	13 02 01.51	01.82	+0.31	"
"	☽'s 2d Limb	13 41 50.02			"
"	κ Virginis	14 04 44.22			"
"	λ Virginis	14 10 50.10	50.22	+0.12	"
16	μ^1 Sagittarii	18 04 35.55	35.65	+0.10	"
"	☽'s 2d Limb	18 34 29.21			"
"	π Sagittarii	19 00 38.57	38.25	—0.32	"
17	β Lyræ	18 44 25.10	25.32	+0.22	"
"	ο Sagittarii	18 55 29.34	29.19	—0.15	"
"	π Sagittarii	19 00 38.33	38.29	—0.04	"
"	δ Aquilæ	19 17 45.50	45.57	+0.07	"
"	☽'s 2d Limb	19 35 11.12			"

Date.	Name of Object.	Sidereal time of meridian passage.	Seconds of Tabular A.R.	Diff.	Observer's initial.
		h. m. s.	s.	s.	
1846, May 4	α Leonis	10 00 11.98	11.96	— 0.02	B[2]
"	☽'s 1st Limb	10 02 34.77			"
"	ϱ Leonis	10 24 44.04	43.96	— 0.08	"
12	*m* Scorpii	16 32 43.69	43.75	+ 0.06	"
"	☽'s 2d Limb	17 11 18.40			"
"	α Ophiuchi	17 27 50.23	49.91	— 0.32	"
"	*o* Ophiuchi	17 34 15.63	15.61	— 0.02	"
13	α Ophiuchi	17 27 50.23	49.93	— 0.30	B[1]
"	*o* Ophiuchi	17 34 15.55	15.63	+ 0.08	"
"	μ^1 Sagittarii	18 04 36.32	36.38	+ 0.06	"
"	☽'s 2d Limb	18 14 01.75			"
"	ξ Sagittarii	18 48 35.16			"
"	ϱ^1 Sagittarii	19 12 47.11	47.15	+ 0.04	"
"	e^2 Sagittarii	19 33 45.10	45.04	— 0.06	"
June 5	Spica	13 17 08.01	08.01	0.00	"
"	☽'s 1st Limb	13 45 33.63			"
"	ϰ Virginis	14 04 44.18	44.25	+ 0.07	"
6	ϰ Virginis	14 04 44.25	44.35	+ 0.10	B[2]
"	λ Virginis	14 10 50.37	50.41	+ 0.04	"
"	☽'s 1st Limb	14 40 32.82			"
"	α^2 Libræ	14 42 25.41	25.41	0.00	"
"	β Libræ	15 08 46.93	46.83	— 0.10	"
8	δ Scorpii	15 51 17.73	17.88	+ 0.15	"
"	β^1 Scorpii	15 56 33.12	33.01	— 0.11	"
"	δ Ophiuchi	16 06 19.82	20.11	+ 0.29	"
"	α Scorpii	16 20 02.29	02.31	+ 0.02	"
"	☽'s 1st Limb	11 40 42.17			"
"	η Ophiuchi	17 01 36.68	36.60	— 0.08	"
"	α Herculis	17 07 40.73	40.70	— 0.03	"
"	ϑ Ophiuchi	17 12 37.29	37.16	— 0.13	"
9	β Libræ	15 08 46.74	46.82	— 0.08	B[1]
"	η Ophiuchi	17 01 36.62	36.61	— 0.01	"
"	ϑ Ophiuchi	17 12 37.20	37.17	— 0.03	"
"	☽'s 2d Limb	17 46 56.07			"
"	μ^1 Sagittarii	18 04 36.97	36.94	— 0.03	"
"	λ Sagittarii	18 18 31.75	31.80	+ 0.05	"
10	μ^1 Sagittarii	18 04 37.04	36.98	— 0.06	B[2]
"	λ Sagittarii	18 18 31.69	31.82	— 0.13	"
"	☽'s 2d Limb	18 51 17.28			"
"	*o* Sagittarii	18 55 30.72	30.67	— 0.05	"
"	π Sagittarii	19 00 39.68	39.78	— 0.10	"
14	β Aquarii	21 23 29.89	29.61	— 0.28	"
"	ε Pegasi	21 30 40.12	40.00	— 0.12	"
"	α Aquarii	21 57 54.81	54.88	+ 0.07	"
"	☽'s 2d Limb	22 51 36.73			"

The instrument used in these observations was a 46-inch Transit, made by Troughton and Simms; 2¾-inch object-glass.

2. Transit of Mercury, May 8th, 1845.

"The first and second contacts of the planet with the sun's limb were lost by clouds.

"Mercury was first seen on the disk of the sun at $2^{h.}\ 48^{m.}\ 31^{s.}$ sidereal time. Observations for the relative positions of the planet and the sun were immediately commenced, and were continued throughout the transit, though frequently interrupted by the passage of cumulus clouds, which prevailed through the day.

"The tremulous state of the atmosphere towards the close of the observations was unfavorable to the accuracy of the measurements.

"It was thought, at one time, that a luminous spot was visible near the centre of the disk of the planet; any decisive evidence of its existence was precluded by the limited power of the instrument.

"At the last contact, the singular phenomenon of the inosculation of the adjacent edges of the planet and sun was distinctly noticed by both observers. The present instance is one of much interest, as it has hitherto been supposed that Mercury is not thus affected when in close proximity to the sun's limb, although this sort of phenomenon has frequently been noticed in the transits of Venus (see *Mem. Royal Ast. Soc.*, Vol. X.).

"The third and fourth contacts were pretty well observed, but owing to the oblique and slow motion of the planet across the sun, combined with the unsettled state of the atmosphere, we were unable to note the times of contact with sufficient accuracy to be of much value for the purposes of terrestrial longitude. The times noted were as follows:—

	h. m. s.		
Third contact,	9 09 00	Observer,	W. C. Bond.
"	9 08 58	"	Geo. P. Bond.
Last or fourth contact,	9 12 09	"	W. C. Bond.
" "	9 12 00	"	Geo. P. Bond.

"In the following observations, B^1 denotes W. C. Bond.

B^2	"	Geo. P. Bond.
W	"	Captain Wilkes, U.S.N.
P	"	Professor Peirce.

"*Micrometric Measurements of the Differences of Right Ascension of Mercury and the Sun's Limb, corrected for Refraction, and also for the Sun's Motion in the Intervals of Transit.*

The telescope used was a Refractor of $2\frac{3}{4}$-inch aperture and 46 inches focus, furnished with Troughton's spider-line micrometer.

Sidereal time of the passage of Mercury.	Diff. of A. R. of Mercury and Sun's 1st Limb.	Observed relative motion in A. R.	Computed relative motion in A. R.	Diff.	Diff. of A. R. of Mercury and Sun's 2d Limb.	Observed relative motion in A. R.	Computed relative motion in A. R.	Diff.	Observed by.	Recorded by.
h. m. s.	.	s.	s.		s.	s.	s.			
2 52 29.6					1.5				B^1	B^1
54 40.9					2.2	+0.7	+0.5	—0.2	"	"
56 31.1					4.0	1.8	0.5	—1.3	"	"
4 02 24.7					*21.0	17.0	16.5	—0.5	"	W
08 55.7					21.6	0.6	1.6	+1.0	"	"
12 38.2					23.1	1.5	0.9	—0.6	"	"
16 23.7	109.7				23.6	0.5	0.9	+0.4	"	"
29 36.2					26.5	2.9	3.3	+0.4	"	"
32 09.2	106.2	+3.5	+3.9	+0.4					"	"
48 02.7					32.1	5.6	4.6	—1.0	"	"
50 38.2	100.7	5.5	4.6	—0.9	32.6	0.5	0.6	+0.1	"	"
5 07 11.7	97.3	3.4	4.1	+0.7	36.1	3.5	4.1	+0.6	"	"
24 57.2	92.2	5.1	4.4	—0.7	†38.6	2.5	4.4	+1.9	"	"
29 51.2	91.2	1.0	1.2	+0.2	42.1	3.5	1.2	—2.3	"	"
32 35.7	90.7	0.5	0.7	—0.2	43.1	1.0	0.7	—0.3	"	"
35 11.2	89.8	0.9	0.6	—0.3	43.6	0.5	0.6	+0.1	"	"
6 07 50.2	82.3	7.5	8.2	+0.7	51.3	7.7	8.2	+0.5	B^2	P
15 12.3	78.7	3.6	1.8	—1.8	55.0	3.7	1.8	—1.9	"	"
20 01.3	77.4	1.3	1.2	—0.1	55.4	0.4	1.2	+0.8	"	"
22 47.3	77.8	—0.4	+0.7	+1.1					"	"
31 11.5	75.0	+2.8	2.1	—0.7	57.8	2.4	2.8	+0.4	"	"
33 41.2	74.0	1.0	0.6	—0.4	57.7	—0.1	+0.6	+0.7	"	"
37 38.3	73.2	0.8	1.0	+0.2					"	"
46 32.1	71.2	2.0	2.2	+0.2	59.4	1.7	1.0	—0.7	"	"
7 05 13.7	66.5	4.7	4.7	0.0	61.6	2.2	2.2	0.0	"	"
08 43.7	65.3	1.2	0.9	—0.3					"	"
22 42.9	61.7	3.6	3.5	—0.1	67.6	6.0	5.5	—0.5	"	"
30 09.2	59.8	1.9	1.9	0.0	71.0	3.4	3.5	+0.1	"	"
32 39.2	60.3	—0.5	+0.6	+1.1	72.1	1.1	1.9	+0.8	B^1	W
35 13.7	59.3	+1.0	0.6	—0.4	72.8	0.7	0.6	+0.1	"	"
8 04 21.7	51.0	8.5	7.3	—1.2	73.8	1.0	0.6	—0.4	"	"
19 24.9	47.3	3.7	3.8	+0.1	81.8	8.0	7.3	—0.7	"	B^2
21 56.2	46.9	0.4	0.6	+0.2	85.6	3.8	3.8	0.0	"	"
24 49.4	45.6	1.3	0.7	—0.6	86.3	0.7	0.6	—0.1	"	"
46 37.3	40.4	5.2	5.4	+0.2	87.7	1.4	0.7	—0.7	"	"
50 36.8	38.6	1.8	1.0	—0.8	92.7	5.0	5.4	+0.4	"	"
9 00 31.0	38.3	0.3	2.5	+2.2	94.2	1.5	1.0	—0.5	"	"

* The original record was 22.0 s., but partially altered to this effect.

† Apparently in error 2 s. for 40.6.

"*Micrometric Measurements for Differences of Declination of Mercury and the Sun's North and South Limbs. Corrected for Refraction.*

Sidereal Time of Observation.	Diff. of Dec. of Mercury and Sun's Limb.	Observed relative motion in Dec.	Computed relative motion in Dec.	Diff.	Observer.
h. m. s.	N. ′ ″	″	″	″	
3 00 43	18 45.3				B[1]
21 09	19 26.1	40.8	36.8	— 4.0	"
26 14	19 41.3	15.2	9.2	— 6.0	"
4 01 39	20 47.7	66.4	63.7	— 2.7	"
8 29	20 50.3	2.6	14.1	+ 11.5	"
13 45	21 05.6	15.3	9.5	— 5.8	"
29 18	S. 10 27.2				"
39 33	10 18.7	8.5	18.5	+ 10.0	"
47 38	10 02.7	16.0	14.6	— 1.4	"
5 02 33	9 31.6	31.1	26.8	— 4.3	"
9 42	9 25.5	6.1	12.9	+ 6.8	"
27 38	8 47.7	37.8	32.3	— 5.5	"
42 12	8 19.2	28.5	26.2	— 2.3	"
49 51	8 04.5	14.7	13.8	— 0.9	"
6 02 04	7 32.5	32.0	22.0	— 10.0	B[2]
11 26	7 25.3	7.2	16.8	+ 9.6	"
17 00	7 05.4	19.9	10.0	— 9.9	"
28 02	6 38.3	27.1	19.8	— 7.3	"
35 50	6 32.5	5.8	14.0	+ 8.2	"
42 04	6 21.8	10.7	11.3	+ 0.6	"
7 02 50	5 42.1	39.7	37.4	— 2.3	"
20 52	5 15.5	26.6	32.6	+ 6.0	"
27 42	4 59.8	15.7	14.1	— 1.6	"
58 58	4 06.8	53.0	56.3	+ 3.3	"
8 17 32	3 30.2	36.6	33.4	— 3.2	"
27 13	3 13.4	16.8	17.5	+ 0.7	B[1]
30 01	3 14.8	— 1.4	5.1	+ 6.5	"
30 49	3 09.0	5.8	1.4	— 4.4	"
31 58	3 05.0	4.0	2.1	— 1.9	"
32 31	3 06.7	1.7	1.0	+ 2.7	"
42 27	2 44.1	22.6	17.8	— 4.8	"
45 45	2 42.0	2.1	5.9	+ 3.8	"
49 39	2 35.5	6.5	7.0	+ 0.5	"
57 17	2 22.8	12.7	13.7	+ 1.0	"

3. Observations on the Comets of 1845 and 1846.

Observations on the Comet of June, 1845, *made at the Cambridge Observatory.* Lat. 42° 22′ 49″. Long. $4^{h.}$ $44^{m.}$ $32^{s.}$.

The observed differences of A. R. and Dec. were applied to the A. R. and Dec. of the stars referred to the mean equinox of January 1st, 1846.

Cambridge Mean Solar Time.	Comet's A. R.	Comet's Dec. N.	Star of Comparison. A. R.	Star of Comparison. Dec. N.	No. of Comp.	
1845. d. h. m. s.	h. m. s.	° ′ ″	h. m. s.	° ′ ″		
June 2 15 39 06	3 27 32.7	38 15 27	3 24 59.57	38 03 37.0	4	Bessel's Zone, 448.
" 4 15 21 25	4 01 55.6	41 48 41	3 34 41.02	42 05 01.4	6	B. A. Cat.
" 6 15 18 34	4 42 38.2	44 19 45	3 39 18.04	44 29 19.8	4	"
" 9 08 52 03	5 41 06.8	45 28 08	5 48 09.44	44 55 28.3	2	"
" 10 10 01 21	6 02 32.0	45 12 01	5 48 09.44	44 55 28.3	2	"
" 11 09 30 30	6 21 17.1	44 39 58	5 48 09.44	44 55 28.3	1	"
" 13 09 24 52	6 54 45.8	42 56 08	7 10 05.81	42 56 18.0	2	Groombridge, 1296.
"			7 11 47.16	42 57 04.1	2	" 1302.
" 14 10 19 30	7 09 22.6	41 49 53	6 39 47.90	41 57 21.0	2	B. A. Cat.
" 17 9 42 35	7 43 17.2	38 15 39	7 36 18.32	37 53 10.7	3	Bessel's Zone, 493.
" 19 9 22 19	7 59 56.0	35 52 39	8 00 05.23	35 54 56.0	3	" 451.
	Comet-star.	Comet-star.				
" 24 09 02 57	— 14.6	+ 06 04.2	8 29	30 30	1	Star is unknown.
" 25 09 29 04	8 32 40.7	29 28 35	8 37 18 50	29 19 19.6	2	B. A. Cat.
" 26 09 13 23	8 36 26.1	28 33 35	8 37 45.90	28 43 34.3	2	Bessel's Zone, 350.
"			8 43 07.56	28 50 10.7	2	B. A. Cat.
"			8 43 21.03	28 55 06.2	2	"
"			8 46 21.86	28 30 54.3	2	"

" The comet was first seen at $14^{h.}$ $15^{m.}$, June 2d. The observations of this morning are made with the spider-line micrometer, and under favorable circumstances.

" *June 4th.* The differences of A. R. were obtained this day from the hour-circle of the equatorial, which reads to single seconds of time. The comet could be seen with the naked eye after most of the stars of the second magnitude had disappeared. It being somewhat cloudy, the length of the tail could not be well determined. The nebulosity was very much condensed and beautifully defined: near the head of the comet, the tail was plainly divided into two branches.

" *June 6th, A. M.* The head of the comet broad and full; in the course of six hours, it has undergone a remarkable change, becoming pointed, and appearing with a spur or secondary tail (which is the brightest of the two) of two degrees in length. The axes of the tails are inclined at an angle of twenty degrees, though the estimation is quite uncertain. The principal tail may be traced through five degrees. The observations are made as on the 4th.

"On the 9th and 10th, the observations are made with the spider-line

and annular micrometers. The changes in the physical appearance of this comet from night to night are particularly interesting.

"*June 25th.* Observed with the spider-line and annular micrometers, the comet being still sufficiently bright to bear illumination ; its tail is one or two degrees long.

Observations on the Comets of February and May, 1846.

Cambridge Mean Solar Time.	Comet's A. R.	Comet's Dec. N.	Star of Comparison. A. R.	Star of Comparison. Dec. N.	No. of Comp.	
1846. d. h. m. s.	h. m. s.	° ′ ″	h. m. s.	° ′ ″		
Feb. 26 08 11 44	1 00 25.7	3 19 17	0 57 45.04	3 22 26.1	2	Bessel's Zone, 36.
Mar. 1 07 35 35	1 00 32.6	8 08 35	0 58 40.18	8 02 22.0	3	Hist. Cel., p. 128.
" 2 07 30 06	1 00 26.1	9 42 34	0 03 24.92	9 28 14.3	3	B. A. Cat., 351.
" 3 07 17 51	1 00 16.6	11 13 36	1 01 10.55	11 12 24.8	3	Bessel's Zone, 124.
" 4 07 4[illegible] 56	1 00 01.7	12 46 05	0 58 29.95	13 03 41.0	3	" "
" 5 08 35 54	0 59 41.6	14 17	0 56 58.06	14 07 00.0	1	B. A. Cat., 305.
" 6 08 12 46	0 59 18.3	15 43 23	1 05 57.20	15 18 58.5	3	" 370.
" 9 07 08 49	0 57 47.7	19 48 46	0 59 42 10	19 55 07.2	3	" 322.
" 10 07 27 39	0 57 09.0	21 08 56	0 59 52.02	21 09 17 9	3	Bessel's Zone, 200.
" 11 07 43 06	0 56 27.3	22 27 31	0 48 59.75	22 37 46.3	2	B. A. Cat., 264.
" 12 07 26 45	0 55 42.6	23 41 42	0 50 12.40	23 41 20.4	3	Bessel's Zone, 331.
" 17 07 38 10	0 51 14.3	29 33 41	0 49 38.43	29 29 06.2	2	Hist Cel., p. 307.
" 18 08 22 12	0 50 11.7	30 41 01	0 54 23.60	30 58 36.0		Bessel's Zone, 390.
"			0 55 40.29	30 40 27.0	1	" "
" 21 07 30 16	0 46 57.4	33 45 28	0 48 45.67	34 01 38.1	1	Hist. Cel., p. 20.
"			0 49 28.77	34 09 19.1	1	"
" 31 07 50 45	0 34 15.2	42 51 32	0 33 56.57	43 05 35.1	4	Bessel's Zone, 443.
Apr. 1 07 51 48	0 32 49.4	43 40 50	0 28 25 17	43 38 17.4	3	B. A. Cat., 152.
" 2 08 07 58	0 31 20.6	44 30 00	0 29 14.28	44 45 21.2	3	Bessel's Zone, 444.
" 3 16 24 21	0 29 21.4	45 34 17	0 38 18.36	45 31 19.0	2	Hist. Cel., p. 249.
" 14 08 31 14	0 11 27.5	53 33 35	0 08 32 67	53 48 09.7	3	" p. 373.
" 15 08 54 17	0 09 27.8	54 17 05	0 02 44.56	54 29 05.5	3	" "
"			0 09 06.14	54 07 29.6	3	" "
" 16 08 20 08	0 07 32.0	54 58 59	0 04 55.59	55 00 08.1	4	" "
" 27 15 30 35	23 38 11.0	62 47 10	23 40 39 91	62 57 42.3	2	Groomb. Cat., 4142,
"			23 42 55.73	62 53 14.8	2	" " [4149.
May 4 15 02 17	23 09 51.1	67 21 12	23 12 19.32	67 16 10.8	4	B. A. Cat., 8124.
" 18 10 48 16	21 20 44.5	74 35 44	21 10 17.07	74 36 46.9	3	" 7393.
" 19 11 07 28	21 08 56.3	74 54 23	21 04 30.00	74 54 50.0	3	Hist. Cel., p. 364.

Comet of May, 1846.

May 19 12 15 02	6 34 58.4	51 31 06	6 41 18.82	51 41 44.6	5	Groombridge, 1226.
" 20 08 55 00	6 39 20.	50 15			1	Instrumental Read-
" 21 09 11 44	6 44 05.7	48 55 48	6 35 54.97	48 56 39 5	1	B. A. C., 2201. [ing.
"			6 43 01.69	49 05 11.6	9	Hist. Cel., p. 383.
" 22 09 01 38	6 47 44.5	47 43 00	6 45 48.21	47 28 10.0	5	" p. 376.
June 3 09 31 20	7 01 27.8	38 11 46	7 03 12.33	38 21 45.0	2	" pp. 208, 209.
"			7 00 41.47	38 26 35.3	4	
" 12 09 02 48	6 57 49.3	33 58 13	6 58 06.63	34 04 00.3		" p. 212.

4. Solar Eclipse of May, 1845.

Micrometric Measurements during the Solar Eclipse of May 5th, 1845. Corrected for Refraction.

Cambridge Observatory, Lat. 42° 22′ 49″, Long. $4^{h.}$ $44^{m.}$ $32^{s.}$.

Mean Solar Time.	Observed Diff. of Dec.	Cor. for Refract'n.	True Diff. of Dec.	
d. h. m. s.	′ ″	″	′ ″	
May 5 17 00 43.0	14 51.8	+ 48.4	15 40.2	Diff. of Dec. of the sun's north limb and the south cusp.
4 57.5	16 05.3	+ 40.2	16 45.5	" "
7 19.1	16 17.2	+ 33.8	16 51.0	" "
9 54.0	1 39.7	+ 02.3	1 42.0	Diff. of Dec. of the sun's north limb and the north cusp.
11 28.3	2 12.1	+ 02.9	2 15.0	" "
13 20.0	2 49.1	+ 03.5	2 52.6	" "
14 46.0	3 31.4	+ 03.7	3 35.1	" "
15 31.7	4 04.7	+ 04.2	4 08.9	" "
17 21.1	5 22.2	+ 05.0	5 27.2	" "

" Note. The sky was clear, but the sun's limb was very tremulous. The refraction corrections are somewhat uncertain, the sun being but one degree above the horizon at the commencement of the series. The observations were made by William C. Bond with the 46-inch equatorial telescope (aperture $2\frac{3}{4}$ inches), and Troughton's spider-line position micrometer.

" The time of ending of the eclipse, expressed in mean solar time for the meridian of this Observatory, as observed by Hon. William Mitchell, with an achromatic telescope, by Tully, of $3\frac{1}{4}$-inch aperture and 45 inches focus, was $5^{d.}$ $17^{h.}$ $18^{m.}$ $02.2^{s.}$.

" As observed by W. C. Bond, with a refractor by Troughton and Simms, of $2\frac{3}{4}$-inch aperture and 46 inches focus, it was $5^{d.}$ $17^{h.}$ $18^{m.}$ $04.3^{s.}$.

" As observed by George P. Bond, with a refractor by Lerebours, having a rock-crystal object-glass of 3 inches aperture and 4 feet focus, it was $5^{d.}$ $17^{h.}$ $18^{m.}$ $04.2^{s.}$.

5. Solar Eclipse of April, 1846.

Micrometric Measurements during the Eclipse of April 24th, 1846. *Corrected for Refraction and for the Sun's Motion in the Intervals of Transit.*

Cambridge Observatory, Lat. 42° 22′ 49″, Long. 4$^{h.}$ 44$^{m.}$ 32$^{s.}$.

Mean Solar Time. April, 1845.	Dist. and Diff. of Dec.	Differences of A. R.	Observations by W. C. B.
d. h. m. s.	′ ″	m. s.	
24 23 17 23.8	8 43.5		Distances of cusps.
20 22.2	11 07.5		" "
23 42.6	13 32.0		" "
26 00.3	15 02.5		" "
33 46.4	10 56.0		Differences of declination of the cusps.
43 42.0	11 27.7		" "
43 44.8		2.01	Diff. of A. R. of sun's 1st limb and preceding cusp.
45 06.1		47.30	" " 2d limb and following cusp.
51 04.0	11 01.0		Diff. of declination of the cusps.
51 06.0		1.80	Diff. of A. R. of sun's 1st limb and preceding cusp.
52 38.2		37.00	" " 2d limb and following cusp.
25 00 09 08.7		3.79	" " 1st limb and preceding cusp.
09 05.0	16 25.5		Diff. of declination of the cusps.
15 21.0	15 34.4		Diff. of A. R. of the cusps.
15 26.6		5.08	Diff. of A. R. of sun's 1st limb and preceding cusp.
20 33.4	14 54.8		Diff. of Dec. of the north limbs of sun and moon.
24 36.4	14 19.9		" " "
28 22.1	13 57.1		" " "
30 43.2	13 37.9		" " "
32 54.6	13 21.2		" " "
34 29.5	13 07.1		" " "
37 41.4	12 48.4		" " "
39 15.3	12 37.3		" " "
41 17.5	12 24.4		" " "
42 38.5	12 12.7		" " "
43 59.6	11 56.8		" " "
45 22.8	11 49.3		" " "
47 01.8	11 42.8		" " "
49 52.3	11 20.9		" " "
50 48.3	11 11.0		" " "
51 39.5	11 05.5		" " "
52 56.3	10 54.7		" " "
54 56.0	10 40.7		" " "
56 11.1	10 34.3		" " "
1 10 01.7	17.0		Diff. of Dec. of sun's south limb and south cusp.
13 11.3	26.3		" " "
15 11.7	36.8		" " "
17 08.7	49.8		" " "
18 21.5	59.6		" " "
29 52.8		1 37.74	Diff. of A. R. of sun and moon's 1st limbs, and of
30 20.3		2 05.16	" [sun's 1st limb and north cusp.
33 27.9		1 42.01	" " "
33 51.0		2 05.11	" " "
36 32.7		1 46.66	" " "
39 51.1		1 51.74	" " "
40 06.8		2 07.41	" " "
42 36.3		1 55.78	" " "
42 36.3		2 08.70	" " "
47 25.0	9 58.1		Distances of the cusps observed by G. P. Bond.
48 30.2	9 23.7		" " "
49 20.9	7 42.4		" " "
50 18.7	6 21.4		" " "

"The times of the beginning and ending of this eclipse were noticed by four observers. The beginning,

d.	h.	m.	s.	
24	23	14	17.2	by W. C. Bond, with a 5-foot refractor.
			20.7	" G. P. Bond, with a 46-inch refractor.
			26.8	" R. T. Paine, with a reflector of 4-inch aperture.
			35.2	" Prof. Peirce, with a 20-inch Var. Transit.

End,

d	h.	m.	s.			
25	01	52	23.0	by Prof. Peirce, with the same instrument as before."		
			14.6	" W. C. Bond,	"	"
			12.4	" George P. Bond,	"	"
			09.1	" R. T. Paine, Esq.,	"	"

Professor Peirce also communicated, from Mr. William Cranch Bond, Director of the Cambridge Observatory, the following

Notes on Meteors.

"1845. *August 10th.* Watched for the 'meteoric shower' of this period; but no meteors whatever were seen. The moon shone quite brightly, while the sky was about half covered with cirro-stratus cloud.

"*August 11th.* A brilliant meteor was seen from the Sears Tower, in broad daylight, at $6^{h.}$ $05^{m.}$. Altitude, 25° $30'$. Azimuth south, 75° east. It described an arc of about seven degrees in one second of time. The color was white, appearing to increase in brilliancy; the form irregular, the estimated diameter less than five minutes. The sky was nearly clear in the direction where the meteor was seen, the sun shining dimly at the time through cirrus cloud. The intensity of the light of this meteor was such as to render it a more conspicuous object than the moon at full would have been. The same meteor was probably seen in Essex, Connecticut, and in the vicinity of Cincinnati, Ohio; but the accounts are not sufficiently precise to enable us to determine its course and distance.

"*August 25th.* A meteor was seen from the vicinity of the College buildings, at about eight o'clock. It appeared of one half the diameter of the moon. By a comparison of the different accounts, its *altitude*,

when first seen, seems to have been about 45°, azimuth south 10° west, and it crossed the meridian in a path inclined fifty degrees to the horizon; its course being towards the southeast, through an arc of ten or twenty degrees. The colors were red and blue. This same body was also seen from New Haven, Connecticut; and, from a comparison of the New Haven and Cambridge apparent positions, it appears that the distance of the meteor, when first seen, was about one hundred and fifty miles from our station, and its height above the earth one hundred miles. It passed over Newport, Rhode Island, Taunton and Quincy, Massachusetts, descending to the earth near Boston Bay. Meteors of large size have been of frequent occurrence in different parts of the world during the months of August and September of this year.

"1846. Telescopic meteors have frequently passed the field of view of the comet-seeker during this season, sometimes as many as five or six on a single night. From their comparative velocities, these would seem to be more distant than those visible to the naked eye.

"*July* 20*th*. At $9^{h.}$ $55^{m.}$ a meteor was seen from the Observatory, in brightness equal to Venus; its course from 77 Cygni to near α Cassiopeæ; its color preceding was a dark red, inclining to purple; the following, a yellowish white. The position was well determined by two observers; but we have no other observations of it for comparison.

"Several attempts have been made to ascertain the amount of parallax of the smaller shooting-stars, but the evenings selected for the purpose have proved unfavorable. In some instances, however, the results seem to indicate a closer proximity than has usually been assigned to these objects.

"*August* 10*th*. Evening cloudy, with rain.

"*August* 11*th*. This evening, shooting stars were abundant, averaging about one in a minute, in a space occupying one quarter of the heavens. The head of Perseus was the principal radiating point. At $10^{h.}$ $10^{m.}$ a meteor, brighter than Venus, passed from α Cassiopeæ, through the square of Pegasus, to about 80 Pegasi. The colors were blue preceding, followed by red and white; it had a cometary tail of dense white light."

Mr. Emerson, in behalf of a committee appointed at a former meeting to consider the subjects of "the relation between the Chinese language, and the languages of Northwestern Europe," and "of Phonotypy and Phonography," remarked, that the committee were not prepared to offer any formal statement on the first-named topic, further than to recommend that Mr. S. P. Andrews, who had been present at nearly all the meetings of the committee, be invited to present his views in a memoir, to be laid before the Academy. Upon the subject of *Phonotypy*, Mr. Emerson made the following report.

"Few subjects can present stronger claims to the attention of all persons interested in the advancement and perfection of the arts of writing and printing, than Phonotypy and Phonography.* Phonotypy has for its object a reform in the existing modes of representing language by printed types. Phonography has the higher object of bringing into use a mode of representing sounds by written characters, which shall be more scientific, more exact, more easily acquired, and four or five times more rapid, than any now in general use.

"The necessity of a reform in the received mode of representing the sounds of our language has occurred to very many persons,† at different times, within the last two or three hundred years. Indeed, this necessity must have been apparent to every philosophical observer who has attentively considered the extreme inadequacy of the small and very imperfect Phœnician alphabet, however modified by Greek and Roman usage, when adopted to express the sounds of a language derived from so many sources, and having so broad a compass and so

* Phonotypy is the art of printing, Phonography of writing, according to sound.

† Sir John Cheke, appointed professor of Greek at Cambridge by Henry the Eighth, in 1540, and knighted by Edward the Sixth, in 1551, made some attempts to improve the orthography of the language. One of his devices was the one so often proposed, of expressing long vowel-sounds by double vowels. His friend and associate in the reform of the pronunciation of Greek, Sir Thomas Smith, also proposed a reform in the orthography of English. Both these were among the most learned men of their times. Many others have appeared, from Mulcaster, in 1582, to Rich, of Troy, New Hampshire, in 1844.

great a variety of sounds, as the English.* The most distinguished of those who have gone so far as to propose a reform are Bishop Wilkins, Sir William Jones, and Dr. Franklin; all of them eminently conspicuous for their strong common sense, and two of them for practical, every-day wisdom. Bishop Wilkins made a most elaborate analysis of the sounds of spoken language, and proposed two very distinct modes of representing them. His essay was received by the Royal Society and ordered to be printed, on the 13th of April, 1668. This analysis was unfortunately proposed as a part of *An Essay towards a Real Character and a Philosophical Language*, and therefore did not attract all the attention to which it was entitled.†

"Dr. Franklin did not apparently go so fully into the subject as Bishop Wilkins; fully enough, however, to show his conviction of the importance and feasibility of the reform. He proposed eight vowels, including *h*, and eighteen consonants. He invented a character for *sh*, one, ŋ, for *ng*, a modification of *a* for *au*, and separate characters for *th* whispered and *th* vocal. He recognized the natural division of consonants by pairs; but had not distinct signs for the long vowels, but expressed them by the short vowels doubled. He omitted *c*, *j*, *q*, *w*, *x*, and *y*; considering *j* as compounded of *d* and *sh*, *ch* as compounded of *t* and *sh*, and *zh* as compounded of *z* and *sh*. He evidently left the work incomplete.

"Sir William Jones, in a dissertation published more than fifty years ago, and prepared with that thoroughness of research for which

* The English language must be made up of the languages of the Celts, who occupied the island before the inroads of the Romans, and who have left dialects of their tongue among the Welsh, Cornish, Irish, and Gaelic; of the Latins of the times of the emperors; of the Danish and Norwegian invaders, many of whom made permanent settlements and spoke Scandinavian dialects; of the Saxon and Danish or Angle invaders of a later age, who formed the Saxon octarchy, speaking German languages; of the Normans of the Conquest, speaking the old French; of the modern French; of classical Latin, introduced with literature by learned men; of Greek, introduced in the same way, as the language of science; of Italian, as the language of the arts; and of words from various other sources.

† Bishop Wilkins recognizes the binary division of consonants, and applies it to all the consonant-sounds, making twenty-six consonants, six letters of a middle nature, and five vowels, *e*, *a*, *â*, *o*, *u*. In his arrangement he begins with sounds formed in the throat, or "inmost palate," and comes out to those formed by the lips. He speaks of possible gutturals and lip sounds which do not occur in any language, and are not therefore to be provided with a symbol.

The following is his arrangement of the letters, which is here presented as

he was remarkable, proposed, for the purpose of representing the sounds of Asiatic words, a new system of vowels and consonants, which were

probably the earliest philosophical analysis of the sounds of our language which has been published in English.

Letters may be considered according to

The organs by which they are framed, whether		Their natures.								
Active.	Passive.	Breathless.	Breathing through the							
			nose.	mouth.						
				Intercepted.					Free.	
				Proceeding from		Made by				
				the middle of the mouth.	each side of the mouth.	Trepidation of the tongue.	Whistling.			
							dense.	subtle.	Of a middle nature.	Vowels.
Tongue, root,	Inmost palate,	c, g;	ngh, ng;	ch, gh;					h, y.	
Tongue, tip,	Foremost palate or root of the teeth.	t, d;	nh, n;	th, dh	lh, l;	rh, r;	sh, zh;	s, z;	hy, i;	e, a, ɑ.
One lip,	The other lip,	p, b;	mh, m;						hw, ɤ;	o, u.
One lip,	Tops of the teeth,			f, v.						
		Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	Mute. Sonorous.	

to be represented by those already existing, by the somewhat profuse use of compounds and diacritical marks.*

"The necessity of a reform is very apparent from an examination of our present alphabet, as used to express the sounds of our language.

"I. Our alphabet is inadequate; there being thirty-eight or forty sounds, and several combinations of sounds, to be expressed, and only twenty-six characters.

"II. It is redundant; three of these twenty-six, namely, *k*, *q*, and *x*, standing for sounds which are represented by other letters; and *q* being by itself without significance.

"III. It is uncertain, contradictory, and false; each of the vowel-signs representing several sounds,† namely: —

a, not less than 9;
e, " " 7;
i, itself a diphthong, 5;
o, not less than 9;
u, also a diphthong, 8;
y, not less than 5;

and each of these sounds being represented by other letters or combinations of letters, the first sound of

a, by 19 different combinations of letters.
e, by 21 " "
i, by 17 " "
o, by 16 " "
u, by 17 " "
y, by 4 " " ‡

* See his *Dissertation on the Orthography of Asiatic Words in Roman Letters*, in the first volume of his works, edited by Lord Teignmouth, 1st ed., p. 175.

† The sound of *a* is different in each two of the following words: imaging, mating, many, paring, father, fat, fall, want, dollar; of *e*, in the following: he, pretty, met, clerk, rendezvous, burden, blame; of *i*, in admiration, stir, sin, bind, business; of *o*, in women, nor, hop, work, sow, go, do, woman, compter; of *u*, in busy, bury, cur, but, unruly, pull, usage, persuade; of *y*, in pity, physic, myrrh, fly, yard. — See Ellis's *Plea for Phonotypy*, p. 8.

‡ As in the following words: of *a*, by *a* in m*a*ting, *a-e* in m*a*t*e*, *a-ue* in pl*ague*, *ai* in p*ai*n, *aigh* in str*aigh*t, *ao* in g*ao*l, *au* in g*au*ging, *au-e* in g*au*g*e*, *ay* in pr*ay*, *aye* in pr*aye*d, *ea* in gr*ea*t, *ei* in v*ei*l, *eig* in r*eig*n, *eigh* in w*eigh*, *eighe* in w*eighe*d, *ey* in th*ey*, *eye* in conv*eye*d, *eyo* in *eyo*t, *ez* in rendez*v*ous; of *e*, by *æ* in C*æ*sar, *e* in b*e*, *e-e* in compl*e*t*e*, *ea* in *ea*ch, *ea-e* in l*ea*v*e*, *ee* in f*ee*t, *eg* in impr*eg*n, *ei* in conc*ei*t, *ei-e* in conc*ei*v*e*, *eo* in p*eo*ple, *ey* in k*ey*, *eye* in k*eye*d, *i* in alb*i*no, *i-e* in magaz*i*n*e*, *ia* in parl*ia*ment, *ie* in gr*ie*f, *ie-e* in gr*ie*v*e*, *œ* in f*œ*tus, *uay* in

"There are fourteen simple vowel-sounds,* and four diphthongs, *i*, *oi*, *ou*, *u*; in all eighteen, to be represented; and there are only six vowel-signs to represent them. They are distributed without any apparent order, or rather in defiance of all order, method, or principle.

"The representatives of the consonant-sounds are not so extravagant; there being only twenty-two or twenty-four consonant-sounds to be represented, and twenty, or rather seventeen, letters to represent them. The representation of these is, however, sufficiently fantastic; two of the perfectly simple consonants, *c* and *t*, being represented in ten different modes each.† On the whole, the thirty-six simple, and six or seven compound sounds, for which it is desirable to have characters, are represented in our language by three hundred and sixty-seven equivalents, an average of more than eight and one half to each sound, amongst which the inexperienced writer has to choose; — and *not a single sound of the English tongue has one uniform representative*. The case is somewhat better for the reader. There are about two hundred letters or equivalents for letters in use, to represent the thirty-seven sounds of our language. Some of these have each a single value; but many of them have a considerable number. Among those of most common occurrence are the combinations *ei*, *eo*, *ie*, and *ough*, which have respectively seven, nine, eleven, and nine values.‡

q*uay*, *ui* in mosq*ui*to, *y* in carr*y*; of *i*, by *ais-e* in *aisle*, *ei* in n*ei*ther, as often pronounced, *eigh* in h*eigh*t, *ey* in *ey*ing, *eye* in *eye*, *i* in b*i*nd, *i-e* in m*i*n*e*, *ic* in in*dic*t, *ie* in l*ie*, *ig* in s*ig*n, *igh* in h*igh*, *is-e* in *is*l*e*, *ui* in beg*ui*ling, *ui-e* in beg*ui*l*e*, *uy* in b*uy*, *y* in fl*y*, *ye* in d*ye*; of *o*, by *au* in h*au*teur, *eau* in b*eau*, *eo* in y*eo*man, *ew* in s*ew*, *o* in g*o*, *o-e* in c*o*v*e*, *oa* in c*oa*l, *oe* in d*oe*, *oh* in *oh!* *ol* in y*ol*k, *oo* in br*oo*ch, *ou* in s*ou*l, *ough* in th*ough*, *ow* in kn*ow*, *owe* in *owe*, *wo* in s*wo*rd; of *u*, by *eau* in b*eau*ty, *eo* in f*eo*d, *eu* in f*eu*d, *ew* in f*ew*, *ewe* in *ewe*, *hu* in *hu*mor, *ieu* in l*ieu*, *iew* in v*iew*, *iewe* in v*iew*ed, *u* in *u*sage, *u-e* in *u*s*e*, *ue* in ag*ue*, *ug* in im*pug*n, *ugh* in *Hugh*, *ui* in s*ui*t, *yew* in *yew*, *you* in *you*; of *y*, by *e* in court*e*ous, *i* in on*i*on, *j* in hallelu*j*ah, *y* in *y*ard. — See Ellis's *Plea*, pp. 5–8.

* Namely: i (ee), as in feet; i, as in it; ɛ (a), as in mate; e, as in met; æ, as in mare; ɑ, as in Sam; a, as in psalm; ɵ, as in caught; o, as in cot; u, as in cur; ɥ, as in curry; ο, as in bone; ɯ, as in fool; and u, as in full.

† *C* in *c*an, *ch*asm, a*che*, ba*ck*, lo*ugh*, *k*ill, wal*k*, *q*uack, *q*uay, e*x*ception; *t* in de*bt*, indi*ct*, suck*ed*, soug*ht*, *phth*isical, *pt*armigan, *t*oe, *Th*omas, ha*tt*er, me*zz*otint. — *Ellis*, p. 7.

‡ The sounds of *ei* are different in every two of the words conceit, forfeit, veil, heifer, their, Leipsig, reimburse; of *eo*, in people, leopard, dungeon, yeoman, galleon, feod, Macleod, aureola, theology; of *ie*, in grief, pitied, friend, soldier, lie, medieval, conscientious, piety, crier, species, courier; of *ough*, in sought, though, through, plough, cough, hough, trough, hiccough, and tough.

The two hundred effective letters have only about five hundred and fifty values, an average of two and one half each. So that to guess what value to give to each letter when written is easier than to divine what symbols to choose to represent a sound uttered, in the proportion of two and one half to eight and one half, or of twenty-five to eighty-five.

"Of the fifty thousand words of our language which have been examined, not more than fifty, or one in a thousand, are pronounced as they are spelt, that is, if we take the first sound or name-sound of each letter as indicating its power. Hence the spelling of a word is no infallible guide to its pronunciation; and there is absolutely no way of indicating, by the alphabet now in use, what the pronunciation of a word should be.

"From the very anomalous and irregular nature of our written language follows the extreme difficulty of learning to read, it taking children not less than fifteen times as long as if each sound had one sign, and each sign one invariable sound. The difficulty is not simply what it would be if they had two hundred characters to learn. It is far greater. In regard to many of the letters and combinations, a child can never learn the sound. He can only learn that the sound is to be ascertained by authority, whenever the letter occurs. Take, for example, the first letter of the alphabet as occurring in the following sentence.

"'M$\overset{1}{a}$ny, comp$\overset{2}{a}$ring this m$\overset{3}{a}$n with his f$\overset{4}{a}$ther, f$\overset{5}{a}$ll into the mist$\overset{6}{a}$ke th$\overset{3}{a}$t he w$\overset{7}{a}$nts little of being $\overset{8}{a}$n im$\overset{9}{a}$ge of him.'

"Here are nine different sounds of the *a*; and a child who had mastered them would be none the better prepared to give the sounds of *a* in any other word which should occur. He could at best guess that it had one of these nine sounds, and proceed to try them in succession, but each of the nine guesses would be wrong if the word were *bread* or *heaven*, or any other in which *a* is silent. Or take the letter *e* in the following sentence: —

"'Let her leave her burden at the rendezvous, and show the clerk her pretty tame mouse.'

"Here the letter has eight different sounds or powers, and the effect of learning it would be only to confuse the mind in reference to the sound of *e* in every word not contained in this sentence. Take one of the combinations of two letters, *ai*, for instance, in this sentence: —'Captain Paine said he had a pair of plaids.' After learning the five sounds

here given, if the learner should read in Scott an account of a feast at a Saxon's table, he would have to guess five times at the pronunciation of *dais*, and each time wrong. The written language is continually misleading thus, and it may be safely said that the sound of a word is learnt, not through the aid of the vowels, but in spite of them. Our language is full of rules, and still more of exceptions. A true alphabet would require no rules, and it would admit of no exceptions. It would always speak for itself. In our present alphabet, every letter oftentimes misleads us, and every letter is sometimes lost. 'It is really deplorable,' as Sir William Jones, speaking of our alphabet, says, 'that our first step from total ignorance should be into gross inaccuracy, and that we should begin our education in English with learning to read the five vowels, two of which, as we are taught to pronounce them, are clearly diphthongs.' — *Works*, 1st ed., Vol. I., p. 183.

"The truth is, that there is such an absence of rule, principle, and analogy in our language, as now written, that it is not to be wondered at that so few learn to read well, and that *nobody learns to spell.** 'Such is the state of our language,' says Sheridan, a man certainly not prejudiced against his native tongue, 'that the darkest hieroglyphics, or most difficult ciphers that the art of man has hitherto invented, were not better calculated to conceal the sentiments of those that used them from all that had not a key, than the state of our spelling is to conceal the true pronunciation of words from all except a few well educated natives.' Such are the difficulties of our language, that with most foreigners beyond the period of early youth the acquisition of a tolerably correct pronunciation is quite impossible; and, in regard to proper names, no person, whether native or foreigner, who has not heard them, can be sure of their pronunciation.†

"The IMPORTANCE of the reform is not less apparent than its necessity. Our language is one of the simplest, richest, and most comprehensive and expressive of languages, and ought to be one of the easi-

* Men who have most to do with the press, and who are therefore most likely to know how to spell, have to confess that they wear out a dictionary in looking for the spelling of words. Can a man be found who never doubts about the spelling of a word?

† Take the instance of the new name, Cochituate, proposed for Long Pond. No person, on reading it, can be sure whether the *o* in the first syllable is long or short, whether *ch* in the second is sounded like *k*, like *sh*, or like *tch*, whether *u* is *u* or *oo*, and whether *ate* sounds long or short *a*, or short *i*, or short *e*; and there is a doubt about the accent.

est of acquisition. Those who speak it belong to the most energetic of all the races, and are everywhere, by might, or craft, or commercial enterprise, or philanthropic action, rapidly extending the area over which it is to be spoken. It is the language of liberty, of poetry, of inventions. It should be made accessible to all. Rapp, a person qualified to judge and to pronounce in the matter of languages, says: — 'Although the French is become the common language, in a diplomatic and social sense, it has never acquired a firm footing in extensive regions out of Europe. The English, on the contrary, may pass for the universal tongue out of Europe; and by its bold fusion and consequent decomposition of the forms of its Gothic and Roman elements, this idiom has acquired an incomparable fluency, and appears especially destined by nature, more than any one of the living, to undertake that part. Were not the impediment of a bizarre, antiquated orthography in the way, the universality of this language would be still more apparent; and it may, perhaps, be said to be fortunate for us other Europeans, that the Englishman has not made the discovery.' *

"The reform proposed by the author or authors of Phonotypy is simply the laying down and carrying out this most philosophical principle, — that each sound of the language should be represented by one and only one sign, and that each sign should constantly represent one sound. This principle is obviously the one on which every alphabet should be formed, and it is therefore, as the basis of the reform, a principle entirely satisfactory to the mind.

"In the analysis of the sounds of the language, aid has been sought and obtained from all accessible sources; from Wilkins, Sir William Jones, Dr. Franklin, Rapp, and especially Ellis; from the alphabets of other languages; from the structure of the organs of articulation, and from the construction of those ingenious philosophical instruments which have been contrived to imitate the sounds of language. Professor Wheatstone, taking advantage of all which has been done by Kratzenstein, Kempelen, and Professor Willis, contrived a simple tube, fitted with a reed and blown by means of bellows, which, of a certain length, gave the vowel I (ee); of another definite length, the vowel E (a); of another, the vowel A (ah); of another, O; and of another, indefinite, U (oo); and being gradually drawn out while blown, gave the series I, E, A, O, U,

* K. M. Rapp, *Physiologie der Sprache*, as quoted by a writer in the *Phonotypic Journal*, Vol. III., p. 249.

and on being farther drawn out, repeated these sounds in the reverse order, then, successively, with different lengths, the same series direct, and again reversed. This experiment settles the order of the vowel-sounds, which had also been already determined by the utterance of a continuous stream of vocal sound, with the parts of the mouth gradually changing their position. It does not determine at which end of the series the vocal sounds should be considered as beginning, which has been settled on other grounds. The *number* of vowel-sounds has been determined by a careful analysis of the spoken language. There seem to be fourteen well settled vowel-sounds in authorized use in the language.* Several others are sometimes heard; as, for example, the sound of *ŏ* in most, among ourselves. Four diphthongs, *i*, *oi*, *ou*, and *u*, from their frequent occurrence in the language, have symbols assigned them.

" The natural order of the consonant-sounds is determined by observing the organs of articulation employed in forming or modifying them, and the order settled upon by Mr. Pitman is that of labials, dentals, palatals, gutturals, nasals, beginning with those formed by the lips and going back to those formed by aid of the teeth, the palate, and the nose. The reverse of this order might have been taken; and has been taken by Bishop Wilkins and Dr. Franklin.

" What particular consonant-sounds are found in the language is determined, as in the case of vowels, by an analysis of the language itself. They are settled at twenty-four, including those of an ambiguous nature, represented by *w*, *y*, and *h*, and called coalescents, and the breathing represented by *h*. After exhausting the letters of the present alphabet, excluding *k*, *q*, and *x*, it became necessary to adopt nineteen new letter-signs for the unrepresented or misrepresented sounds. These

* Eight are long, as 1. *ee* in keep, 2. *a* in make, 3. *a* in mare, 4. *a* in mark, 5. *au* in caught, 6. *u* in burn, 7. *o* in pole, and 8. *oo* in fool; and six short, namely, 9. *i* as in pin, 10. *e* in met, 11. *a* in sat, 12. *o* in top, 13. *u* in cup, and 14. *oo* in foot. Of the short, only two correspond precisely to long sounds, namely, 11 to 3, and 12 to 5. The order in the phonic scale would seem to be nearly

$$\begin{array}{ll} 1 & \\ & 9 \\ 2 & \\ & 10 \\ 3 - & 11 \\ 4 & \\ 5 - & 12 \\ 6 & \\ & 13 \\ 7 & \\ & 14 \\ 8. & \end{array}$$

have been chosen with great care, and after very numerous experiments. The present form of the phonetic alphabet being as high as the seventeenth of those which have been successively proposed.

The proposed alphabet is the following: —

CONSONANTS.

Type.		Example of Sound.	Type.		Example of Sound.	Type.		Example of Sound.
P	p	*p*ay	Γ	ŧ	*th*igh	Є	ç	*ch*ew
B	b	*b*ay	Ƌ	đ	*th*y	J	j	*J*ew
F	f	*f*ew	S	s	*s*eal	Σ	ʃ	me*sh*
V	v	*v*iew	Z	z	*z*eal	Ʒ	ʒ	mea*s*ure
M	m	su*m*	L	l	bai*l*	C	c	*c*all
W	w	*w*ay	R	r	ba*r*e	G	g	*g*all
T	t	*t*oe	N	n	su*n*	Ŋ	ŋ	su*ng*
D	d	*d*oe	Y	y	*y*ea	H	h	*h*ay

VOWELS.

Ɩ	i	f*ee*t	Ꭿ	ɑ	S*a*m	Ꮎ	o	b*o*ne
I	i	f*i*t	A	a	ps*al*m	U	u	h*u*t
Ɛ	ɛ	m*a*te	Θ	θ	c*augh*t	Ɯ	ɯ	f*oo*l
E	e	m*e*t	O	o	c*o*t	Ꮃ	ɯ	f*u*ll
Æ	æ	m*a*re	Ɥ	ɥ	h*ea*rd	Ʉ	ʉ	n*ew*s

COMPOUND VOWELS.

Ɨ	ɨ	h*igh*	Φ	ɸ	h*oy*	Ȣ	ȣ	h*ow*

" Some objections which are made to the project of reform ought to be considered.

" 1. It is feared by many that if the new mode of printing should prevail, all the libraries now in existence will become useless. This fear is entirely groundless. When a knowledge of the language, or facility in reading, is once acquired through phonotypy, it will be perfectly easy to read books printed in the common type; far more easy than it is for us to read old black-letter English, or the English of the times of Chaucer. It will probably take less time, — I have no doubt myself that it will take much less time, — to read phonotypically first and heterotypically afterwards, than to learn to read by the common mode alone; inasmuch as, when one has learnt the phonotypic alphabet, he may learn to read of himself without farther assistance, the letters giving necessarily the true sounds of the words, and, the knowledge of the words of the language once acquired, one may, afterwards, soon read them with ease, however disguised by a barbarous heterography.

" 2. It is objected that it will, if adopted, oblige all of us to learn a

considerable portion of a new alphabet. Let any one who feels this objection make the attempt, for only two hours, to read a well printed phonotypic book, and the objection will disappear. When the art of writing was first introduced among the Anglo-Saxons, the art of deciphering it was well called *reading*, that is *guessing*. Reading English is a sort of guessing at the meaning of hieroglyphical symbols; and so admirably are we all trained to the art by learning to read, that any one will find it surprisingly easy to guess at the power of all the newly introduced letters of the phonotypic alphabet, without looking into a *First Book* for them. This statement, which I believe is literally true of the small letters, may, perhaps, admit of an exception in regard to the capitals, when found in a line by themselves. The new letters are carefully selected, as has been already stated, to represent those sounds which least frequently occur; and in assigning them characters, forms have in most instances been chosen with which we are already familiar or which resemble the letters whose power they most nearly represent.*

"3. A third objection which is urged against the reform is, that by changing the spelling we are in danger of losing sight of the derivation of a word, and thus of losing one clew to its meaning. Let Dr. Franklin answer this objection, as it was made to him originally by a correspondent.† 'Now as to the inconveniences you mention; the first is, "that all our etymologies would be lost, consequently we could not ascertain the meaning of many words." Etymologies are *at present* very uncertain, but such as they are, the old books would still preserve them, and etymologists would there find them. Words in the course of time change their meanings, as well as their spelling and pronunciation; and we do not look to etymologies for their present meanings. If I should call a man a knave and a villain, he would hardly be satisfied with my telling him that one of the words originally signified only

* The sound of *ee* in feet is represented by a letter which is nearly the italic *i*; *a* in date and *a* in psalm are represented by common forms of our written *e* and *a*; *au* in caught by ɵ; *u* in cur, by ɥ, *u* lengthened, the sign proposed by Dr. Franklin; *o* in grow, by o, and *oo* and *u* in fool and full by ɯ, u, two *u*'s combined; *ew* as heard in yew, the name of a tree, by ɥ; *oy* in boy, by ǒ, *o* with a contracted *y* above it; *ch* in etch by ꞔ, which it most nearly resembles; *th* in loath, by one form of *t*, ŧ; *th* in loathe by đ, *d* and *t* combined; *sh* in mesh, by a long *s*, ʃ; *zhe* in measure, by a written *z*, ʒ; and *ng* by a sign suggested by Dr. Franklin, ŋ, *n* with the last part of *g* combined with it.

† Miss Stevenson.

a lad or servant, and the other an under ploughman or the inhabitant of a village. It is from present usage only the meaning of words is to be determined.' To this answer may be added, that phonography will probably accompany phonotypy, and that when words from different languages are written, side by side, in the letters of an alphabet of signs formed on philosophical principles, as those of phonography are, a multitude of derivations will reappear which had been long buried out of sight under the barbarous and fantastic ruins of exploded heterographical spellings.*

"4. A fourth objection may be stated, with its answer, in the words of Dr. Franklin. 'Your second inconvenience is, "that the distinction between words of different meaning and similar sound would be destroyed." That distinction is already destroyed in pronouncing them; and we rely on the sense alone of the sentence to ascertain which of the several words, similar in sound, we intend. If this is sufficient in the rapidity of discourse, it will be much more so in written sentences, which may be read leisurely, and attended to more particularly, in case of difficulty, than we can attend to a past sentence, while the speaker is hurrying us along with new ones.'

"The existing forms of letters have been retained to represent those sounds which they are found, after an extended numerical analysis, to stand for most frequently in the present alphabet. This fact renders the change in the appearance of phonotypical printing as small as possible, and the difficulty of reading it the least possible; so that any person accustomed to read our language as now printed may at once read phonotypical printing without difficulty, and in an hour or two read it fluently. The advantages following from the adoption of this reformed alphabet will be very great.

"1. It may be acquired in one fifteenth part of the time necessary for the present.†

"2. When acquired, it leads the learner to the correct pronunciation of every word which he meets with.

* This fact, very strikingly proved by writing phonographically words in different languages from the same root, gives satisfactory evidence of the truth of a principle admitted by Archdeacon Hare: — "The common pronunciation of a word frequently agrees better than its spelling with its etymology and analogy."

† A writer in *Chambers's Edinburgh Journal* says one twentieth the time. A child has now, instead of the mere alphabet, to learn nearly all the words of the language, as if they were represented by separate hieroglyphics.

"3. It dispenses entirely with the difficult, and to most persons impossible, acquisition of learning to spell. A knowledge of the just sound suggests infallibly the true spelling, and the spelling, with equal certainty, the correct pronunciation.

"4. By the omission of silent letters, it renders reading one fifth part more rapid than at present.

"5. It will render the acquisition of reading and spelling attainable to millions, to whom it is now unattainable.

"6. It will enable a writer to represent any proper name or word of an unknown language in such a manner as to be read by a stranger with precisely the same pronunciation which the writer gives it, inasmuch as variations of sounds are made visible to the eye.

"7. It will tend to banish provincialisms,* as each written word suggests its correct pronunciation.†

"8. By representing the long and short vowels by different letters, it renders possible the adoption of a few perfectly simple and comprehensive rules of accent, a thing which, up to this time, has been nearly wanting in the language."

William S. Sullivant, Esq., communicated to the Academy, through the Corresponding Secretary, a paper entitled, "Contributions to the Bryology and Hepaticology of North Ameri-

* Dr. Franklin used to regret that there was not something like a phonotypic dictionary in existence in his day, as it would, he said, have enabled him, when in England, to avoid the peculiarities of American pronunciation.

† In order that it may have this effect, the books printed phonotypically must give the received pronunciation of the best speakers in England. This is a matter of the greatest importance; and America looks to England for a guidance in this respect which may be safely followed. Peculiarities of speech — provincialisms — are growing up and strengthening in all parts of our country; and although this cannot probably be prevented for the mass of the people, who learn the language only from the ear, it may for the educated part of the community. Phonotypy offers the means of rendering the pronunciation of well educated people nearly uniform, wherever the language is read and spoken. But in order to do this, it must be under the direction of persons who have, all their lives, been accustomed to hear the language spoken in its purity. Peculiarities of particular districts of the mother country are as much to be avoided as provincialisms or Americanisms. This point has not received the attention it deserves from the editors of the *Phonotypic Journal;* and it would not be difficult to point out in their pages instances of pronunciation which would, even in New England, be considered as decidedly inaccurate, and sometimes vulgar.

ca," with drawings, illustrating the following species, namely, *Phyllogonium Norvegicum*, Brid. (recently detected in Ohio); *Fissidens minutulus*, Sulliv.; *F. exiguus*, Sulliv.; *Schistidium serratum*, Hook. & Wils.; *Aneura sessilis*, Sulliv.; *Marchantia disjuncta*, Sulliv.; *Notothylas valvata* and *N. orbicularis*, Sulliv.

Dr. Holmes, from the committee appointed at the meeting in March to report upon the case of Henry Safford, the young Vermont mathematician, stated, that, at the request of Professor Peirce, the drawing up of a full report had been deferred until the arrival of the boy in this vicinity, where he is expected to reside. Some interesting statements were made by Professor Peirce, from which it would appear that the mere calculating faculty is not by any means as remarkable in him as it was in Zerah Colburn, but that it is rather incidental, as a part of extraordinary reflective powers.

S. P. Andrews, Esq., of Boston, and George Engelmann, M. D., of St. Louis, Missouri, were elected Fellows of the Academy.

The following were elected Foreign Honorary Members of the Academy, viz.: —

Prof. Louis Agassiz, of Neuchatel, Switzerland.

M. Edouard de Verneuil, of Paris.

M. Joseph Decaisne, Professor at the Jardin des Plantes, Paris.

DONATIONS TO THE LIBRARY,

FROM MAY TO AUGUST, 1846.

Jomard. Seconde Note sur une Pierre gravée trouvée dans un Ancien Tumulus Americain. 8vo. pamph. Paris, 1845. From the Author.

Catalogue of Stars, made under the Direction of the British Association for the Advancement of Science. 4to. London, 1845. From the Association.

Address at the Inauguration of the Honorable Edward Everett, as

President of the University in Cambridge. 8vo. pamph. Boston, 1846. From President Everett.

Collections of the Massachusetts Historical Society. Vol. IX. 8vo. Boston, 1846. From the Society.

Mémoires de l'Académie Imperiale des Sciences de St. Petersbourg. 6me Serié. — Sciences Naturelles, Tom. II., livr. 4 - 6, and Tom. IV., livr. 6. 1838 & 1845. — Sciences Politiques, etc., Tom. IV., livr. 3, and Tom. V., livr. 5, 6. 1838 & 1845. — Sciences Mathematiques et Physiques, Tom. I., livr. 5, 6, Tom. II., livr. 1, 2, and Tom. III., livr. 4 - 6. 1838 & 1844. From the Imperial Academy.

Mémoires presentés à l'Académie Impériale des Sciences de St. Petersbourg, etc., Tom. III., livr. 1 - 6. 1837. Tom. IV., livr. 6. 1845. From the Imperial Academy.

Recueil des Actes de la Séance Publique de l'Académie Impériale des Sciences de St. Petersbourg, tenue le 29 Déc. 1844. 4to. St. Petersbourg, 1845. From the Imperial Academy.

Dr. S. G. Morton. Observations on the Ethnography and Archæology of the American Aborigines. 8vo. pamph. New Haven, 1846. From the Author.

Fifty-ninth Annual Report of the Regents of the University of the State of New York. 8vo. Albany, 1846. From Dr. A. Gray.

Lieutenant Gillis. Astronomical Observations made at the Naval Observatory, Washington. (Congressional Document.) 8vo. Washington, 1846.

Abhandlungen der Math.-Phys., Classen der Koenigl. Bayerschen Akademie der Wissenschaften, München. Vols. XIII., XVI., and XIX. (1837 - 1845.) 4to. Munich. From the Bavarian Academy.

Bulletin der Koenigl. Bayersch. Akad., etc. No. 1 - 52, for 1845. No. 1 - 5, for 1846. 4to. From the Academy.

Gehlehrte Anzeigen. Vols. XVI. - XIX., inclusive. 4to. Munich. From the Bavarian Academy.

Almanach der Koenigl. Bayersch. Akad., etc. 1844, 1845. Munich. From the Academy.

J. P. Von Spix and *C. F. P. Von Martius.* Reise in Brasilien, etc. 3 vols. 4to. Munich, 1823 - 31. From Professor Von Martius.

Martius. Systema Materiæ Medicæ Vegetabilis Brasiliensis. 12mo. Leipsic, 1843. From the Author.

Martius. Die Kartoffel Epidemie. 4to. pamph. Munich, 1842. From the Author.

Dr. P. F. Von Walther. Rede zum Andenken an Dr. Ignatz Döllinger. 4to. pamph. Munich, 1841. From Professor Von Martius.

Dr. F. Döllinger. Gedachtnissrede auf S. T. Von Sömmering. 4to. pamph. Munich, 1830. From Professor Von Martius.

Dr. F. Lamont. Ueber des Magnetische Observatorium. 4to. pamph. Munich, 1833. From the Author.

Professor J. G. Zuccarini. Ueber die Vegetationsgruppen in Bayern. 4to. pamph. Munich, 1833. From the Author.

Dr. A. Wagner. Andentungen zur Charakteristik des Organischen Lebens. 4to. pamph. Munich, 1845. From the Author.

Annals of the Lyceum of Natural History. New York. Vols. I.–III., and Vol. IV., fasc. 1–7. 1844–46. 8vo. New York. From the Lyceum.

Chart of the Harbour of Annapolis, and Chart of the Harbour of New Bedford. United States Coast Survey, A. D. Bache, Superintendent. From the Treasury Department.

Two hundred and eighty-sixth Meeting.

October 28, 1846. — Special Meeting.

The Academy met at their Hall, previous to adjourning to King's Chapel to hear the Eulogy of the Hon. Daniel A. White upon their late President.

Messrs. G. B. Emerson, Gould, Greene, and the President, were appointed a committee to arrange the monthly meetings for the coming season.

Two hundred and eighty-seventh Meeting.

November 3, 1846. — Monthly Meeting.

The President in the chair.

The thanks of the Academy were voted to the Hon. Daniel A. White, for his able, discriminating, and faithful delineation of the character of our late admired and much lamented President, and that a copy of the discourse be requested for the press.